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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/667,775	09/22/2000	Hidenori Kawanishi	717-445P	8167

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EXAMINER	
MONDT, JOHANNES P	
ART UNIT	**PAPER NUMBER**
2826	

DATE MAILED: 01/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/667,775	KAWANISHI ET AL.
	Examiner	**Art Unit**
	Johannes P Mondt	2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 29 October 2003.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-9 and 11-54 is/are pending in the application.

4a) Of the above claim(s) 21-54 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,4-9 and 11-20 is/are rejected.

7)☒ Claim(s) 2 and 3 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.

4) ☐ Interview Summary (PTO-413) Paper No(s). _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/29/03 has been entered.

Response to Amendment

Amendment filed 10/29/03 with aforementioned Request for Continued Examination has been entered and forms the basis of this office action. In said Amendment Applicant amended claims 1, 4, 5, 6, 11 and claims dependent thereon. Claim 10 has been cancelled. Claims 21-54 had previously been non-elected. Therefore, claims 1-9 and 11-20 have been examined. Comments on Remarks appended to said Amendment are included below under "Response to Arguments".

Response to Arguments

2. Applicant's arguments filed 10/29/03 have been fully considered but they are not persuasive. In particular, the substantial amendment of claims 1, 4, 5 and 6 (and thus of all independent and dependent elected claims) necessitated rejection under substantially different prior art. In particular, arguments on Nishino et al and Hirano et al

are thus obsolete. All arguments in the traverse depend on the new claim language when subjected to a hypothetical rejection based on Nishino et al and Hirano et al. Therefore, no specific comments are needed on the traverse by Applicant as contained in the Remarks including in said Amendment.

Drawings

3. *Figures 15-17* should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. ***Claim 1*** is rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka (5,177,753). Tanaka teaches a semiconductor laser device (cf. title, abstract, Figure 6, col. 2, l. 28 – col. 3, l. 44, and col. 4, l. 15-40) including: a semiconductor laser chip 5 (cf. col. 2, l. 50); and a resin 15/18/20 (cf. col. 3, l. 15-18 for element 15, col. 3, l. 48-52 and col. 4, l. 59-66 for element 18, and col. 4, l. 44 for element 20) having a light

diffusion capability by virtue of its constitution (cf. col. 3, l. 19-23) (quite apart from the at least two – component mixture that is comprised in said resin it is argued by the examiner that "a light diffusion capability" is inherent to any massive substance unless specifically quantified further because light scatters off matter, thus performing a random walk through the medium, which is the microscopic cause of the phenomenon of diffusion), wherein the resin comprises two or more materials of different refractive indices (cf. col. 3, l. 19-23 and col. 4, l. 59-66), and wherein the semiconductor laser chip is encapsulated within the resin 15/18/20 forming a molded lens, namely through a curved face of the resin member (cf. col. 5, l. 3-12). In conclusion, Tanaka anticipates claim 1.

Claim Objections

6. ***Claim 6*** is objected to because of the following informalities: the wording "includes" should be replaced by "including". Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. ***Claims 18 and 19*** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. Through claim 18 both claims contain subject matter not described in the specification in such a way as to enable one skilled in the art

to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In particular, the range claimed in claim 18 is empty, because its lower limit exceeds its upper limit: 7160 nm = 7.16 μm > 1.5 μm.

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. ***Claim 15*** recites the limitation "the semiconductor laser chips" in line 2. There is insufficient antecedent basis for this limitation in the claim.

11. ***Claim 17*** recites the limitation "the semiconductor laser chips" in line 2. There is insufficient antecedent basis for this limitation in the claim.

12. ***Claim 20*** recites the limitation "the semiconductor laser chips" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. ***Claims 4, 7, 16, 17 and 20*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (5,177,753) in view of Thornton et al (5,386,428).

<u>On claim 4:</u> Tanaka teaches a semiconductor laser device (cf. title, abstract, Figure 6, col. 2, l. 28 – col. 3, l. 44, and col. 4, l. 15-40) including: a semiconductor laser chip 5 (cf. col. 2, l. 50) encapsulated within resin 15/18/20 (cf. col. 3, l. 15-18 for element 15, col. 3, l. 48-52 and col. 4, l. 59-66 for element 18, and col. 4, l. 44 for element 20) having a light diffusion capability by virtue of its constitution (cf. col. 3, l. 19-23) (quite apart from the at least two – component mixture that is comprised in said resin it is argued by the examiner that "a light diffusion capability" is inherent to any massive substance unless specifically quantified further) and forming a molded lens (namely through a curved face of the resin member (cf. col. 5, l. 3-12) of the molded resin 15; cf. col. 3, l. 19-44).

Tanaka does not necessarily teach the further limitation that the semiconductor laser chip includes a plurality of light emitting portions, although said semiconductor laser chip includes at least one light emitting portion inherently.

However, it would have been obvious to include said further limitation in view of Thornton et al, who teach a plurality of light emitting portions (a first portion centered around region 16 and a second portion centered around region 40; cf. col. Figure 1 and col. 4, l. 38 – col. 5, l. 21) in a semiconductor laser chip (formed on single substrate 9; cf. col. 4, l. 19; see also title and abstract).

Motivation for inclusion of the teaching by Thornton et al in this regard in the invention by Tanaka derives from the advantage of having more than one color (cf. col. 1, l. 10-32). Combination of said teaching with said invention is straightforward because

the interior details of the semiconductor laser chip are independent of the invention by Tanaka aimed at improving protection of said semiconductor laser chip.

On claim 7: the control that is the essence of claim 7 is inherent in the device of claim 4: spot size of an emitted light beam is inherently controllable by the size of the light-emitting portion in the semiconductor laser chip (because light is emitted over a larger or smaller area as a result of such adjustment) and the radiation angle of an emitted light beam is inherently controllable through the orientation of said light-emitting portion of the semiconductor laser chip (said orientation determines the direction of the emitting light, said direction being defined with respect to the internal coordinates of the light-emitting portion); furthermore, given their lengths the light-emitting portion can be subjected to adjustment of the intervals between them so as to control the spot size, whereas an orientational adjustment of said interval also implies control of the radiation angle; furthermore, the number or plurality of said light emitting portions, again given their individual dimensions, controls the spot size while the size, material and shape of the molded resin determines the amount of diffusion to which the laser light is exposed after leaving the semiconductor chip, said diffusion determining the path of the photons through scattering, and thus the change in spot size, whilst the direction of the laser beam is determined by the index of refraction of said molded resin, hence on the material constitution of said molded resin. Therefore, the further limitation of claim 7 does not distinguish over the prior art.

On claim 16: the first (16) and second (40) light-emitting portions by Thornton et al emit light beams having different wavelengths λ_1 and λ_2, 780 nm and 850 nm, respectively (cf. Figure 1 and col. 4, l. 38-43 and col. 5, l. 6-10).

On claim 17: with reference to the rejection under 35 USC 112, second paragraph of claim 17 on the basis of a lack of antecedent basis, and excluding the aspect of said lack of antecedent basis it has to be remarked here that the light emitting portions of the semiconductor laser chip by Thornton et al emit light beams having different wavelengths (cf. Figure 1 and col. 4, l. 38-43 and col. 5, l. 6-10).

On claim 20: with reference to the aforementioned rejection of this claim under 35 USC 112, second paragraph for lack of antecedent basis of the wording (semiconductor laser chips", it must be remarked here that the light emitting portions in the semiconductor laser chip as taught by Thornton et al are arranged in parallel (cf. Figure 1).

15. ***Claims 4 and 7*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (5,177,753) in view of Claisse et al (Electronics Letters Volume 28, No. 21 (1992)) (previously made of record and copy provided).

On claim 4: Tanaka teaches a semiconductor laser device (cf. title, abstract, Figure 6, col. 2, l. 28 – col. 3, l. 44, and col. 4, l. 15-40) including: a semiconductor laser chip 5 (cf. col. 2, l. 50) encapsulated within resin 15/18/20 (cf. col. 3, l. 15-18 for element 15, col. 3, l. 48-52 and col. 4, l. 59-66 for element 18, and col. 4, l. 44 for element 20) having a light diffusion capability by virtue of its constitution (cf. col. 3, l. 19-23) (quite

apart from the at least two – component mixture that is comprised in said resin it is argued by the examiner that “a light diffusion capability” is inherent to any massive substance unless specifically quantified further) and forming a molded lens (namely through a curved face of the resin member (cf. col. 5, l. 3-12) of the molded resin 15; cf. col. 3, l. 19-44).

Tanaka does not necessarily teach the further limitation that the semiconductor laser chip includes a plurality of light emitting portions, although said semiconductor laser chip includes at least one light emitting portion inherently.

However, it would have been obvious to include said further limitation because the use of multiple quantum wells rather than single quantum wells or bulk wells has long been known to offer the advantage of higher yield over single quantum wells and the advantage of manufacturability at significantly higher precision and perfection than all other structural embodiments of active regions in semiconductor laser chips, as evidenced for instance by Claisse et al; see Figure 2 for the internal quantum efficiency of single quantum wells and multiple quantum wells. Specifically be referred to the greatly improved internal quantum efficiency especially for laser lengths less than about 400 micron. Internal quantum efficiency is advantageous for any semiconductor laser chip.

Motivation to include the teaching by Claisse et al in this regard in the invention by Tanaka stems from the aforementioned increased quantum efficiency. The teaching by Claisse et al can be easily *combined* with the aforementioned invention, because any

modification is limited to the active layer embodiment. Therefore, *success* in the implementation of the aforementioned combination can be *reasonably expected*.

On claim 7: the control that is the essence of claim 7 is inherent in the device of claim 4: spot size of an emitted light beam is inherently controllable by the size of the light-emitting portion in the semiconductor laser chip (because light is emitted over a larger or smaller area as a result of such adjustment) and the radiation angle of an emitted light beam is inherently controllable through the orientation of said light-emitting portion of the semiconductor laser chip (said orientation determines the direction of the emitting light, said direction being defined with respect to the internal coordinates of the light-emitting portion); furthermore, given their lengths the light-emitting portion can be subjected to adjustment of the intervals between them so as to control the spot size, whereas an orientational adjustment of said interval also implies control of the radiation angle; furthermore, the number or plurality of said light emitting portions, again given their individual dimensions, controls the spot size while the size, material and shape of the molded resin determines the amount of diffusion to which the laser light is exposed after leaving the semiconductor chip, said diffusion determining the path of the photons through scattering, and thus the change in spot size, whilst the direction of the laser beam is determined by the index of refraction of said molded resin, hence on the material constitution of said molded resin. Therefore, the further limitation of claim 7 does not distinguish over the prior art.

16. ***Claims 5 and 8*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (5,177,753) in view of Hirayama et al (5,970,081).

On claim 5: Tanaka teaches a semiconductor laser device (cf. title, abstract, Figure 6, col. 2, l. 28 – col. 3, l. 44, and col. 4, l. 15-40) including: a semiconductor laser chip 5 (cf. col. 2, l. 50) encapsulated within resin 15/18/20 (cf. col. 3, l. 15-18 for element 15, col. 3, l. 48-52 and col. 4, l. 59-66 for element 18, and col. 4, l. 44 for element 20) having a light diffusion capability by virtue of its constitution (cf. col. 3, l. 19-23) (quite apart from the at least two – component mixture that is comprised in said resin it is argued by the examiner that "a light diffusion capability" is inherent to any massive substance unless specifically quantified further) and forming a molded lens (namely through a curved face of the resin member (cf. col. 5, l. 3-12) of the molded resin 15; cf. col. 3, l. 19-44).

Tanaka does not necessarily teach the further limitation that the semiconductor laser chip includes at least one light emitting portion having a width of about 7 μm or more.

However, it would have been obvious to include said further limitation in view of Hirayama et al, who teach that, in the art of semiconductor laser devices a laser chip emitting light through a light-emitting portion with a width of 18 micrometer (cf. column 6, lines 48-55), hence in the range claimed by Applicant, is standard in the art (see also Figure 2 in Hirayama et al).

Motivation to include the teaching in this regard by Hirayama et al in the invention by Tanaka is the advantage of added power in the laser beam, said advantage being

achieved by having a wide light-emitting portion and also by reducing peak intensity within said laser beam as it traverses the molded resin that may inflict damage by thermal stress. *Combination* of said teaching with the inventions is easy, because inclusion of the teaching by Hirayama et al maximally only requires the replacement of the actual laser chip by the one taught by Hirayama et al and does not impact on any of the other aspects of the invention by Tanaka. *Success* in implementing said combination can therefore be reasonably expected.

On claim 8: the further limitation as defined by claim 8 is inherent in the device of claim 5: with reference to the discussion of claim 7 as given above and incorporated herein by reference, spot size and radiation angle can be controlled through adjustment of the width of the light-emitting portion irregardless of its width, and thus also for a width of said light-emitting portion of about 7 micron or more; and size, material, and dimension of the molded resin offers supplemental control through the scattering of the photons in said molded resin, whereby the spot size is increased whilst the direction of the light beam depends on the index of refraction, hence on the material constitution, of said molded resin. Therefore, the further limitation as defined by claim 8 does not distinguish over the prior art.

17. ***Claims 6 and 9*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (5,177,753) in view Andrews (5,422,905).

On claim 6: Tanaka teaches a semiconductor laser device (cf. title, abstract, Figure 6, col. 2, l. 28 – col. 3, l. 44, and col. 4, l. 15-40) including: a semiconductor laser

chip 5 (cf. col. 2, l. 50) encapsulated within resin 15/18/20 (cf. col. 3, l. 15-18 for element 15, col. 3, l. 48-52 and col. 4, l. 59-66 for element 18, and col. 4, l. 44 for element 20) having a light diffusion capability by virtue of its constitution (cf. col. 3, l. 19-23) (quite apart from the at least two – component mixture that is comprised in said resin it is argued by the examiner that "a light diffusion capability" is inherent to any massive substance unless specifically quantified further) and forming a molded lens (namely through a curved face of the resin member (cf. col. 5, l. 3-12) of the molded resin 15; cf. col. 3, l. 19-44).

Tanaka does not necessarily teach the further limitation of the inclusion of at least one additional semiconductor laser chip.

However, it would have been obvious to include said further limitation because the utility of multiple beam laser diode chips has previously been amply recognized, as witnessed, for instance, by Andrews (cf. column 1, lines 13-36), who teaches two closely spaced and aligned semiconductor laser chips 22 and 24 (cf. column 3, line 34-60) providing parallel beams of light (cf. Figure 8).

The invention by Andrews has applicability inter alia to optical disk readers and multi-spot printers (cf. column 1, lines 13-36) and the incorporation of the teaching by Andrews in this regard in the invention by Tanaka is *motivated* by enlarging the technology range to which said invention can be applied. *Combination* of said teaching with said inventions is easily accomplished by aligning another laser chip with the one already in place. *Success* in the implementation is thus *reasonable to expect.*

On claim 9: the further limitation as defined by claim 9 is inherent in the device of claim 6: with reference to the discussion of claim 7 as given above and incorporated herein by reference, spot size and radiation angle can be controlled through adjustment of the width of the light-emitting portion; and size, material, and dimension of the molded resin offers supplemental control through the scattering of the photons in said molded resin, whereby the spot size is increased whilst the direction of the light beam depends on the index of refraction, hence on the material constitution, of said molded resin. Therefore, the further limitation as defined by claim 9 does not distinguish over the prior art.

18. ***Claim 11*** is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (5,177,753) in view of Okuda (6,049,423). Tanaka anticipates claim 1 (on which claim 11 depends). Tanaka does not necessarily teach the further limitation as defined by claim 11, although Tanaka does teach a two-component mixture for the materials (cf. col. 3, l. 19-23) with explicit mention of both epoxy resin and silica resin (cf. col. 3, l. 19-23). However, it would have been obvious to include said further limitation in view of Okuda because Okuda teaches that a mixture of transparent epoxy resin and silica resin, said resins having different refractive indices so as to bring about enhanced light diffusion, has long been practiced in the art of light-emitting devices: acrylic resin of index 1.53 with glass or silica resin of index 1.535 for the specific purpose of forming a light diffusion layer 16 (cf. column 4, lines 23-47).

Motivation to include the teaching by Okuda in this regard in the invention as essentially taught by Tanaka stems from the purpose as stated by Tanaka to achieve a smooth transparent resin face 15a (cf. col. 3, l. 15-23). *Combination* of said teaching with both inventions is easy: only the material constitution of the resin needs to be changed. *Success* in the implementation of said combination can therefore be *reasonably expected.*

Furthermore, the acrylic resin and the silica resin recited by Okuda merely constitute obvious examples of material selections that satisfy the criterion for the material constitution formulated by Tanaka. Applicant is reminded in this regard that it has been held that mere selection of known materials generally understood to be suitable to make a device, the selection of the particular material being on the basis of suitability for the intended use, would be entirely obvious. In re Leshin 125 USPQ 416.

19. ***Claims 12-13*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka as applied to claim 1 above, and further in view of either Andrews (5,422,905) and Brooks et al (6,049,125), or in view of Missaggia et al (IEEE Journal of Quantum Electronics 25 (9), pp. 1988-1992 (1989)). As detailed above, claim 1 is unpatentable over Tanaka. Tanaka does not necessarily teach the further limitation of claims 12-13. However, as evidenced by Andrews, it is well known in the art of semiconductor laser diode technology to contain the laser diode or diodes in a heat sink 38 (cf. column 3, lines 60-69) made of high thermal conductivity material such as copper, metallized beryllia (BeO), silicon, or diamond. In the case of copper the thermal conductivity is

approximately 390 W/m.K. Therefore, the relevant length scale obtained by dividing the relevant surface area by the thickness of the copper that corresponds to the limit of 100 K/W for the thermal resistance as indicated by the further limitation of claim 13 is the common value of approximately 1 mil or greater for said relevant length scale. That this thickness range is in fact common is illustrated by Brooks et al who teach heat sink thicknesses in the range of between 5 and 10 mil (cf. column 3, lines 24-31), hence amply over 1 mil and certainly satisfying the weaker limitation of claim 12.

Motivation to include the teachings of Andrews and Brooks in this regard in the invention as anticipated by Tanaka stems from the improved heat conductance of the semiconductor laser device: thermal stress is inherently increased by the encapsulation in Tanaka, thus increasing the need for an effective heat sink. In the alternative, Missaggia et al teach a microchannel heat sink that contains a semiconductor diode laser array by virtue of the latter being bonded to it (cf. title and caption of Figure 1), with a value of 0.04 deg/W per unit area in square cm (cf. page 1990, second column). A 15 degree rise in temperature for a power of 80W (cf. page 1991, second column) is indicated, given the reported density of laser diodes in the array; which is below the upper limit in the further limitation of claim 12.

Motivation to include the teaching by Missagia et al in this regard in the invention as essentially taught by Nishino et al and Hirano et al stems from the improved heat extraction offered through the microchannel heat sink as invented by Missaggia et al. The teaching by Missagia et al can be easily *combined* with the device as essentially taught by Nishino et al and Hirano et al by planting the laser device on top of the heat

sink plate of Missaggia et al as indicated in Figure 1 without any further impact on other aspects of the inventions. *Success* in implementing the combination can thus be *reasonably expected*.

Moreover, applicant fails to show in his disclosure that the range as indicated in claim 12 or the approximate value that is indicated in claim 13 (for the thermal resistance) is *critical to the invention.* Applicant is reminded that it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

20. ***Claims 14 and 15*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka and Claisse et al as applied to claim 4 above, and further in view of Hazell et al (IEEE Journal of Quantum Electronics 34 (12), pp. 2358-2363 (1998)). Although neither Tanaka nor Claisse et al necessarily mention that the plurality of light-emitting portions of the same semiconductor laser chip emit light beams of the same wavelength, usually the multiple quantum wells generally are repeating units of single quantum wells and thus generally produce light of the same wavelength and hence can be used to produce monochromatic light, for evidenced, for instance, by Hazell et al, who teach a 1.3 micron multiple quantum well laser. As an obvious method to increase the total intensity of the desired monochromatic light all multiple quantum wells could thus be designed to produce light of the same wavelength.

Motivation for inclusion of the teaching by Hazell et al in this regard is the possibility to achieve higher overall intensity of the light of a desired wavelength. *Combination* of the teaching by Hazell et al with the device as essentially taught by Tanaka and Claisse et al can be easily achieved by employing repeating units of single quantum wells in the implementation of the teachings by Claisse et al, which would not impact on any other design consideration in said invention. *Success* of said combination can therefore be *reasonably expected*.

On claim 15: with reference to the rejection under 35 USC 112, second paragraph, on the basis of a lack of antecedent basis, and excluding said aspect of lack of antecedent basis, it is to be remarked here that the semiconductor laser chip by Hazell et al has light emitting portion emitting light beams having the same wavelength (as already remarked in the rejection of claim 14).

Allowable Subject Matter

21. ***Claim 2*** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: strictly within the context of claim 1 with all its limitations as described in the current amendment, the prior art found to date, including Tanaka (5,177,753), do not teach that the semiconductor chip does not directly contact the resin.

22. ***Claim 3*** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: strictly within the context of claim 1 with all its limitations as described in the current amendment, the prior art found to date, including Tanaka (5,177,753), do not teach that the inclusion of a light diffusion plate between the semiconductor chip and the molded lens.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P Mondt whose telephone number is: 703-306-0531 BEFORE February 4, 2004; and 571-272-1919 AFTER February 4, 2004. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 703-308-6601 BEFORE February 4, 2004, and on 571-272-1915 AFTER February 4, 2004. The fax phone number for the organization where this application or proceeding is assigned is 703-308-5399.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

JPM
January 10, 2003